1\_εργασία

ΖΟΥΜΠΟΥΡΙΔΟΥ ΜΑΡΙΑ, 4575

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Ecology

Ecology (from [Greek](https://en.wikipedia.org/wiki/Greek_language): οἶκος, "house", or "environment"; -λογία, "study of")is the branch of [biology](https://en.wikipedia.org/wiki/Biology)which studies the interactions among organisms and their environment. Objects of study include interactions of [organisms](https://en.wikipedia.org/wiki/Organism) with each other and with [abiotic components](https://en.wikipedia.org/wiki/Abiotic_component" \o "Abiotic component) of their [environment](https://en.wikipedia.org/wiki/Environment_(biophysical)). Topics of interest include the [biodiversity](https://en.wikipedia.org/wiki/Biodiversity), distribution, [biomass](https://en.wikipedia.org/wiki/Biomass_(ecology)), and [populations](https://en.wikipedia.org/wiki/Population) of organisms, as well as cooperation and competition within and between [species](https://en.wikipedia.org/wiki/Species). [Ecosystems](https://en.wikipedia.org/wiki/Ecosystems) are dynamically interacting systems of [organisms](https://en.wikipedia.org/wiki/Organisms), the [communities](https://en.wikipedia.org/wiki/Community_(ecology)) they make up, and the non-living components of their environment. Ecosystem processes, such as [basic production](https://en.wikipedia.org/wiki/Primary_production" \o "Primary production), [pedogenesis](https://en.wikipedia.org/wiki/Pedogenesis" \o "Pedogenesis), [nutrient cycling](https://en.wikipedia.org/wiki/Nutrient_cycling" \o "Nutrient cycling), and [niche construction](https://en.wikipedia.org/wiki/Niche_construction" \o "Niche construction), regulate the flux of energy and matter through an environment. These processes are sustained by organisms with specific life history traits. Biodiversity means the varieties of [species](https://en.wikipedia.org/wiki/Species), [genes](https://en.wikipedia.org/wiki/Gene), and [ecosystems](https://en.wikipedia.org/wiki/Ecosystem), enhances certain [ecosystem services](https://en.wikipedia.org/wiki/Ecosystem_services).

Ecology is not synonymous with [environmentalism](https://en.wikipedia.org/wiki/Environmentalism), natural history, or [environmental science](https://en.wikipedia.org/wiki/Environmental_science" \o "Environmental science). It overlaps with the closely related sciences of [evolutionary biology](https://en.wikipedia.org/wiki/Evolutionary_biology), [genetics](https://en.wikipedia.org/wiki/Genetics), and [ethology](https://en.wikipedia.org/wiki/Ethology" \o "Ethology). An important focus for ecologists is to improve the understanding of how biodiversity affects ecological function.

Ecologists seek to explain:

* Life processes, interactions, and [adaptations](https://en.wikipedia.org/wiki/Adaptations)
* The movement of materials and [energy](https://en.wikipedia.org/wiki/Energy) through living communities
* The [successional](https://en.wikipedia.org/wiki/Ecological_succession" \o "Ecological succession) development of ecosystems
* The [abundance](https://en.wikipedia.org/wiki/Abundance_(ecology)) and distribution of organisms and biodiversity in the context of the [environment](https://en.wikipedia.org/wiki/Environment_(biophysical)).

Ecology has practical applications in [conservation biology](https://en.wikipedia.org/wiki/Conservation_biology), wetland management, [natural resource management](https://en.wikipedia.org/wiki/Natural_resource_management) ([agroecology](https://en.wikipedia.org/wiki/Agroecology), [agriculture](https://en.wikipedia.org/wiki/Agriculture), [forestry](https://en.wikipedia.org/wiki/Forestry), [agroforestry](https://en.wikipedia.org/wiki/Agroforestry), [fisheries](https://en.wikipedia.org/wiki/Fisheries)), city planning ([urban ecology](https://en.wikipedia.org/wiki/Urban_ecology)), [community health](https://en.wikipedia.org/wiki/Community_health), [economics](https://en.wikipedia.org/wiki/Ecological_economics), [basic](https://en.wikipedia.org/wiki/Basic_science) and [applied science](https://en.wikipedia.org/wiki/Applied_science), and human social interaction ([human ecology](https://en.wikipedia.org/wiki/Human_ecology)). For example, the [*Circles of Sustainability*](https://en.wikipedia.org/wiki/Circles_of_Sustainability) approach treats ecology as more than the environment 'out there'. It is not treated as separate from humans. Organisms (including humans) and [resources](https://en.wikipedia.org/wiki/Resource_(biology)) compose [ecosystems](https://en.wikipedia.org/wiki/Ecosystem" \o "Ecosystem)which, in turn, maintain biophysical feedback mechanisms that moderate processes acting on living ([biotic](https://en.wikipedia.org/wiki/Biotic_component)) and non-living ([abiotic](https://en.wikipedia.org/wiki/Abiotic" \o "Abiotic)) components of the planet. Ecosystems sustain life-supporting functions and produce [natural capital](https://en.wikipedia.org/wiki/Natural_capital) like [biomass production](https://en.wikipedia.org/wiki/Biomass) (food, fuel, fiber, and medicine), the regulation of [climate](https://en.wikipedia.org/wiki/Climate), global [biogeochemical cycles](https://en.wikipedia.org/wiki/Biogeochemical_cycles), [water filtration](https://en.wikipedia.org/wiki/Water_filtration), [soil formation](https://en.wikipedia.org/wiki/Soil_formation), erosion control, flood protection, and many other natural features of scientific, historical, economic, or intrinsic value.

The word "ecology" ("Ökologie") was coined in [1866](https://en.wikipedia.org/wiki/1866) by the German scientist [Ernst Haeckel](https://en.wikipedia.org/wiki/Ernst_Haeckel). Ecological thought is derivative of established currents in philosophy, particularly from ethics and politics. Ancient Greek philosophers such as [Hippocrates](https://en.wikipedia.org/wiki/Hippocrates) and [Aristotle](https://en.wikipedia.org/wiki/Aristotle" \o "Aristotle)laid the foundations of ecology

19th century. [Evolutionary](https://en.wikipedia.org/wiki/Evolution) concepts relating to adaptation and [natural selection](https://en.wikipedia.org/wiki/Natural_selection) became the cornerstones of modern [ecological theory](https://en.wikipedia.org/wiki/Theoretical_ecology).

Behavioural ecology

All organisms can exhibit behaviours. Even plants express complex behaviour, including memory and communication. Behavioural ecology is the study of an organism's behaviour in its environment and its ecological and evolutionary implications. Ethology is the study of observable movement or behaviour in animals. This could include investigations of motile [sperm](https://en.wikipedia.org/wiki/Sperm) of plants, mobile [phytoplankton](https://en.wikipedia.org/wiki/Phytoplankton), [zooplankton](https://en.wikipedia.org/wiki/Zooplankton) swimming toward the female egg, the cultivation of fungi by [weevils](https://en.wikipedia.org/wiki/Weevils), the mating dance of a [salamander](https://en.wikipedia.org/wiki/Salamander), or social gatherings of [amoeba](https://en.wikipedia.org/wiki/Amoeba).

Adaptation is the central unifying concept in behavioural ecology. Behaviours can be recorded as traits and inherited in much the same way that eye and hair colour can. Behaviours can evolve by means of natural selection as adaptive traits conferring functional utilities that increases reproductive fitness.

Predator-prey interactions are an introductory concept into food-web studies as well as behavioural ecology. Prey species can exhibit different kinds of behavioural adaptations to predators, such as avoid, flee, or defend. Many prey species are faced with multiple predators that differ in the degree of danger posed. To be adapted to their environment and face predatory threats, organisms must balance their energy budgets as they invest in different aspects of their life history, such as growth, feeding, mating, socializing, or modifying their habitat. Hypotheses posited in behavioural ecology are generally based on adaptive principles of conservation, optimization, or efficiency. For example, "[t]he threat-sensitive predator avoidance hypothesis predicts that prey should assess the degree of threat posed by different predators and match their behaviour according to current levels of risk"or "[t]he optimal [flight initiation distance](https://en.wikipedia.org/wiki/Escape_distance) occurs where expected postencounter fitness is maximized, which depends on the prey's initial fitness, benefits obtainable by not fleeing, energetic escape costs, and expected fitness loss due to predation risk."

Elaborate sexual [displays](https://en.wikipedia.org/wiki/Display_(zoology)) and posturing are encountered in the behavioural ecology of animals. The [birds-of-paradise](https://en.wikipedia.org/wiki/Birds-of-paradise), for example, sing and display elaborate ornaments during [courtship](https://en.wikipedia.org/wiki/Courtship). These displays serve a dual purpose of signalling healthy or well-adapted individuals and desirable genes. The displays are driven by [sexual selection](https://en.wikipedia.org/wiki/Sexual_selection) as an advertisement of quality of traits among [suitors](https://en.wikipedia.org/wiki/Suitors).

Molecular ecology

The important relationship between ecology and genetic inheritance predates modern techniques for molecular analysis. Molecular ecological research became more feasible with the development of rapid and accessible genetic technologies, such as the [polymerase chain reaction (PCR)](https://en.wikipedia.org/wiki/Polymerase_chain_reaction). The rise of molecular technologies and influx of research questions into this new ecological field resulted in the publication [Molecular Ecology](https://en.wikipedia.org/wiki/Molecular_Ecology) in 1992. [Molecular ecology](https://en.wikipedia.org/wiki/Molecular_ecology) uses various analytical techniques to study genes in an evolutionary and ecological context. In 1994, [John Avise](https://en.wikipedia.org/wiki/John_Avise) also played a leading role in this area of science with the publication of his book, Molecular Markers, NaturalHistory and Evolution. Newer technologies opened a wave of genetic analysis into organisms once difficult to study from an ecological or evolutionary standpoint, such as bacteria, fungi, and [nematodes](https://en.wikipedia.org/wiki/Nematode). Molecular ecology engendered a new research paradigm for investigating ecological questions considered otherwise intractable. Molecular investigations revealed previously obscured details in the tiny intricacies of nature and improved resolution into probing questions about behavioural and biogeographical ecology. For example, molecular ecology revealed [promiscuous](https://en.wikipedia.org/wiki/Promiscuous) sexual behaviour and multiple male partners in [tree swallows](https://en.wikipedia.org/wiki/Tree_swallow) previously thought to be socially [monogamous](https://en.wikipedia.org/wiki/Monogamous). In a biogeographical context, the marriage between genetics, ecology, and evolution resulted in a new sub-discipline called [phylogeography](https://en.wikipedia.org/wiki/Phylogeography" \o "Phylogeography).

**Class Schedule**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Lesson** | **Topic** | **Assignment** | **Points** | **Due** |
| 1 | What is Distance Learning? | Wiki #1 | 10 | March 10 |
| Presentation | 20 |  |
| 2 | History & Theories | Brief Paper | 20 | March 24 |
| Spring Break | | | | |
| 3 | Distance Learners | Discussion #1 | 10 | April 7 |
| Group Project | 50 | April 14 |
| 4 | Media Selection | Blog #1 | 10 | April 21 |

Human ecology

Ecology is as much a biological science as it is a human science. Human ecology is an [interdisciplinary](https://en.wikipedia.org/wiki/Interdisciplinary) investigation into the ecology of our species. "Human ecology may be defined: (1) from a bioecological standpoint as the study of man as the ecological dominant in plant and animal communities and systems; (2) from a bioecological standpoint as simply another animal affecting and being affected by his physical environment; and (3) as a human being, somehow different from animal life in general, interacting with physical and modified environments in a distinctive and creative way. A truly interdisciplinary human ecology will most likely address itself to all three." The term was formally introduced in 1921, but many sociologists, geographers, psychologists, and other disciplines were interested in human relations to natural systems centuries prior, especially in the late 19th century.

The ecological complexities human beings are facing through the technological transformation of the planetary biome has brought on the [Anthropocene](https://en.wikipedia.org/wiki/Anthropocene" \o "Anthropocene). The unique set of circumstances has generated the need for a new unifying science called [coupled human and natural systems](https://en.wikipedia.org/wiki/Coupled_human_and_natural_systems) that builds upon, but moves beyond the field of human ecology. Ecosystems tie into human societies through the critical and all encompassing life-supporting functions they sustain. In recognition of these functions and the incapability of traditional economic valuation methods to see the value in ecosystems, there has been a surge of interest in [social](https://en.wikipedia.org/wiki/Social_capital)-[natural capital](https://en.wikipedia.org/wiki/Natural_capital), which provides the means to put a value on the stock and use of information and materials stemming from [ecosystem goods and services](https://en.wikipedia.org/wiki/Ecosystem_services). Ecosystems produce, regulate, maintain, and supply services of critical necessity and beneficial to human health (cognitive and physiological), economies, and they even provide an information or reference function as a living library giving opportunities for science and cognitive development in children engaged in the complexity of the natural world. Ecosystems relate importantly to human ecology as they are the ultimate base foundation of global economics as every commodity, and the capacity for exchange ultimately stems from the ecosystems on Earth.

Ecosystem Ecology

Ecosystems may be habitats within biomes that form an integrated whole and a dynamically responsive system having both physical and biological complexes. Ecosystem ecology is the science of determining the fluxes of materials (e.g. carbon, phosphorus) between different pools (e.g., tree biomass, soil organic material). Ecosystem ecologist attempt to determine the underlying causes of these fluxes. Research in ecosystem ecology might measure [primary production](https://en.wikipedia.org/wiki/Primary_production) (g C/m^2) in a [wetland](https://en.wikipedia.org/wiki/Wetland) in relation to decomposition and consumption rates (g C/m^2/y). This requires an understanding of the community connections between plants (i.e., primary producers) and the decomposers (e.g., [fungi](https://en.wikipedia.org/wiki/Fungi) and bacteria),

The underlying concept of ecosystem can be traced back to 1864 in the published work of [George Perkins Marsh](https://en.wikipedia.org/wiki/George_Perkins_Marsh) ("Man and Nature"). Within an ecosystem, organisms are linked to the physical and biological components of their environment to which they are adapted. Ecosystems are complex adaptive systems where the interaction of life processes form self-organizing patterns across different scales of time and space. Ecosystems are broadly categorized as [terrestrial](https://en.wikipedia.org/wiki/Terrestrial_ecosystem), [freshwater](https://en.wikipedia.org/wiki/Freshwater_ecosystem), atmospheric, or [marine](https://en.wikipedia.org/wiki/Marine_ecosystem). Differences stem from the nature of the unique physical environments that shapes the biodiversity within each. A more recent addition to ecosystem ecology are [technoecosystems](https://en.wikipedia.org/wiki/Technoecosystems" \o "Technoecosystems), which are affected by or primarily the result of human activity.

Η ΟΙΚΟΓΕΝΕΙΑ ΜΟΥ